UNC PEMBROKE | MAYNOR HONORS COLLEGE

Magical Beads: Implementation of Newton's Laws for 4th Graders in STEM Outreach Program

Senior Project

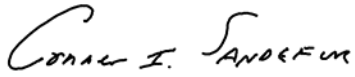
In partial fulfillment of the requirements for
The Esther G. Maynor Honors College
University of North Carolina at Pembroke

By

Leanna Jacobs
Biology
5/1/2020

5/6/2020

Leanna Jacobs
Honors College Scholar — Date



5/6/2020

Dr. Conner Sandefur
Faculty Mentor — Date

Joshua Kalin Busman, Ph.D.
Senior Project Coordinator — Date

Acknowledgements

I cannot express enough gratitude for Mr. Sandy Jacobs, Miranda Jones, and Tysheick Stephens for providing such great encouragement throughout my project. Without you all, I would not have had the courage to really take the lead on the experiment.

I would like to say thank you to the Community and Civic Engagement Department for agreeing to work with me on this project.

To my mentor Dr. Sandefur, there would never be enough words to explain how thankful I am for you. You have been such a great mentor throughout this process. I could not have completed this project without your continued help and guidance.

I would like to give thanks to the Maynor Honors College for having this Senior Project, which allowed me to experience this great opportunity and work with some great people.

Dr. Busman and Dr. Decker thank you for always being available to answer questions and offer advice whenever I needed it.

Abstract

This paper is a reflection of my experience working with Science Buddies. I share what Science Buddies is and my motivation for wanting to collaborate with them. I also describe the process of me discovering the topic I conducted my experiment on. This paper will also briefly address the challenges faced due to recent COVID-19 circumstances. I address the impact I believe the program has on the lives of the fourth grader participants.

My Senior Project was spent with Science Buddies conducting The Magical Beads experiment. Science Buddies is a newly started program- within the last couple of years- where volunteers go to nearby elementary schools and do kid-friendly science experiments to teach kids all about the fascinating things science has to offer. Currently, Science Buddies partners with Union Chapel elementary and teaches fourth graders a couple of times a month (almost once every week). The schedule varies due to how far along the students are in their classes and is based on the availability of the education department teacher and class that they travel with. The goal is to broaden knowledge while providing a fun way of learning. Science Buddies volunteers hope this program helps the children feel like they can be successful in the scientific world and not to be scared to take interest in it.

My interest in partnering with Science Buddies for my senior project was for several reasons. I knew I did not want to spend my senior project doing laboratory research; I have being doing that all throughout my four years of obtaining my biology degree. I wanted to have a project that let me share some of the vast knowledge I have learned in my undergraduate degree field. I knew I wanted to do a volunteer/community service type of project. Then once is why once I heard about Science Buddies, I jumped on the opportunity to work with them.

Once they agreed to work with me for my project, the real work began. My initial plans were to volunteer and lead two experiments at Union Chapel. I also wanted to set-up a meeting with the sports department, and with the National Pan-Hellenic Council (NPHC) Greek council at the University of North Carolina at Pembroke (UNCP) to talk about the Science Buddies program to try to get more exposure for the program and help

it grow. Unfortunately, with the onset of COVID-19 and the unusual circumstances we were put through, I was not able to follow through with the meetings I wanted to have but luckily, I was still able to volunteer and lead one experiment with the program.

The experiment I ended up conducting was the Magical Beads experiment. I wanted to make sure my experiment aligned with some of the learning objectives the students have for the 4th grade. After looking on the North Carolina Department of Public Instruction 4th grade science standards, I decided to focus on forces and motion. I looked on multiple websites trying to collect ideas for the experiment and make sure the project was safe and fun. I came across magical beads. This project takes Mardi Gras bead necklaces (5 per cup) cutting them and hot gluing them together. You have to place the beads in a circular pattern in the cup. The project demonstrates gravity, and Newton's Laws of Inertia. To get all the beads out of the cup, you can simply pull on the top end and let the forces of gravity and inertia do their job. The point of my project was to teach these two concepts. However, for the students to understand these forces in depth, I was able to find a fourth grade level worksheet on teacherspayteacher.com and also a cartoon video that explained Newton's Laws of Motion.

To prepare for my experiment day, I had to prepare all the magical bead cups and get the worksheets printed. I had to try to recruit volunteers to make sure I had assistance on the day. I also had to prepare my little lecture of key words and background information so the students would understand the material we were going to learn for the day.

On my presentation day, I was so nervous wondering if the students would enjoy my experiment. Once we got to the classroom, all my fears vanished because the students

were so nice and happy to be there. I started with introducing myself and letting the students know that they were all a part of my senior project. I told them I had magical beads and proposed a question of how to get the beads out of the cup? I got answers like flip the cup over, grab them out, or cut the cup. So, I demonstrated pulling on the top end of the beads and then letting the rest of beads follow and fall out onto the floor. The students where in pure shock and they all wanted to try it. I told them to understand the secret of my magic beads; they had to let me teach them a few things first. Then I conducted my lecture of key words and giving examples of the words for the students to understand what the material was about. After the lecture, I showed them the cartoon video; after the video ended we filled out the worksheet (using the keywords from earlier in the lecture) as one big group. Finally, the students were then able to play with the magical beads. They all had so much fun and could not believe that it worked. After every student got a turn with the cups at their table, we then proposed a challenge for the students. The challenge was trying to stop the beads from coming out at a specific color necklace on the strand. This challenge brought in another aspect of Newton's Laws of Inertia. The students took the challenge head on, most of them running up to me to show me all the different colors they could catch.

Shortly, after the challenge it was time to go so the group passed out blow pops to the students because it was Valentine's Day. While packing up to leave a bunch of the students wanted to know when the next time I would be coming back. I told them early April is when my next experiment will be. I feel so disappointed that my experience was cut short with the students and I was not able to conduct my other experiment. However,

even though my experience may have ended early, I hope the Science Buddies program continues to thrive for many years to come.

Overall, the Science Buddies programs is an amazing program that can offer a very positive impact on these young students life. This program makes them feel like they are missing class to have fun, which they, are but ultimately they are still learning very interesting concepts in the STEM field. I believe this program gives these students a sense of empowerment to not be afraid to enter the STEM field when they get older. I felt so honored to be able to teach these students some of the knowledge I have learned throughout my college career. I hope I made a lasting impression on these students' lives and maybe even convinced them that STEM is actually cool. I feel honored to have been able to partner with Science Buddies and conduct my senior project. I believe over time this program will expand and become a vital program in the surrounding community of UNCP impacting future generations of students for many years to come.

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